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Editorial.

POLYVALENT SERUM FOR WOUNDS.

In regard to the references in last month's issue of the use of polyvalent serum in the treatment of wounds, we give this month some reports of cases treated by Monsieur Cuvillier. The article and reports originally appeared in *Revue Générale de Médecine Vétérinaire* for July 1, 1915. Monsieur Cuvillier puts forward some good reasoning in favour of the serum, and we hope that it will have a sufficient trial over an extensive field. Hitherto the employment of sera has been chiefly against specific diseases, and the use of a serum in the treatment of wounds in veterinary practice is quite novel. Any agent that supports and helps the leucocytes to defend the body against bacterial invasion and to bring about the healing of lesions ought to be of special value in this War. The study of wound treatment has been greatly stimulated recently, and it is a sign of the times that Dr. Alexis Carrell, of the Rockefeller Institute, U.S.A., assisted by Mr. Henry Dakin, the chemist, has just claimed to have discovered a new antiseptic which will destroy the poisonous agents in wounds without damaging the tissues. A medication that will make a wound bacteria free, followed by one that will aid the cells of the body in their work of defence and repair, seem to be all that can be desired or needed in wound treatment.

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AGRICULTURE AND THE VETERINARY PROFESSION.

When this War is over it is probable that many of our soldiers will not return to the sedentary occupations in factories, shops, and offices that they engaged in before enlisting. They will have looked long on the fields, the sky, and the hedgerows, and many of them will have mingled with men the greater part of whose life has been spent in the open air in close contact and communion with Nature and agriculture. They will have come under the fascinating influence of the out-of-door life. Little wonder, then, if they shy at going back to an existence with inadequate breathing space and small room for healthy expansion and advance. What they saw but in patches previously they thought only transiently about, but now the call of the country will have become a fixed influence. "They will know what they prefer, instead of humbly saying Amen to what the world tells them they ought to prefer, and so they will keep their souls alive." There is likely to be an accession to the army of the workers on the land, and it will be well for the Motherland if she endeavours to keep as much as possible of this company within her own borders.

An increase of food supply (and this includes an augmenting of the number of live stock) is a matter of vital importance to this country both now and in the future. It is ever a reproach to us that we are dependent for five-sixths of our daily bread on overseas production. We are glad to see signs that there is an awakening to the hazard of this fact and that opportunity is to be given for agricultural speeding up. The Board of Agriculture and War Savings Committee is out to see that as much as possible is to be got out of all available land, that uncultivated areas and vacant building plots are acquired, and that co-operation and mutual cultivation of the soil are stimulated and encouraged. Let us hope that this activity will not be merely a flash in the pan or a thrust in a bag. Not any too much has hitherto been done for the agriculturist here. The ability to pay rent and rates has been looked on more as a reason for letting the farmer alone, and for ignoring the peasant, than for encouraging them to grow and expand. The major operations of agriculture upon which the regular food supply of the nation depends ought not to be subject to grave pecuniary risks and violent fluctuations

of the market. It is a flagrant anachronism that to be patriotic, grow wheat, and become bankrupt should be natural sequences. They ought never to be sequences at all. Increased activities in the industry of agriculture must certainly be backed up by capital; the more money that is put into the land the greater the output of wheat, oats, barley, rye, and potatoes, the greater the stores of hay, straw, cereals, and roots and the larger the head of stock that can be kept. The State must support and protect these operations from their initiation to their fulfilment. In this new life and fresh vigour in agricultural circles the veterinary surgeon must be prepared to play a full and worthy *rôle*. His prosperity depends in a marked degree on the successful progress of the science and art of cultivation. Many of the embryo embarkers on the sea of agriculture will need sound and reliable advice not only on the ailments of their stock but on hygiene, and the daily practices that help to keep disease away.

We had over 5,000,000 cattle, 13,000,000 sheep, and 2,000,000 pigs in this country in 1914. How many of these were bred, fed, and reared up to the best advantage? There is an abundant field, exclusive of horses, for the play of sound reasoning and expert advice in animal matters, and in this counsel the veterinary surgeon should take a major part. It has often seemed to us that we are behind other countries in the knowledge of the best means to an end in the production of any required animal form and qualities. At any rate, if we have the knowledge we do not practise it widely and deeply enough. Although we have men who need no instruction in the methods of breeding and rearing, yet does the general intelligence on these subjects reach a high level? We think not. The argument has been advanced in opposition to the recent Order against calf slaughter that so many poor calves are dropped that it will not pay to rear them. Surely this is a reflection on the breeder. The price of animal foodstuff is almost always disproportionately higher than the recompense for the products of breeding and rearing. Not only is it in the interests of agriculture and the State that the number of the domesticated animals should increase, but also that the intrinsic value of the supply should augment. A good understanding of the means and ways necessary to produce the best creature form and capabilities will pay. With models before us or in our mind's

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eye we ought to be able to work up to them and even improve on them. Many of our agricultural schools and colleges are doing excellent work in the matter of teaching the principles of a good knowledge of breeding and rearing operations, but in our opinion they are making worthier and more commendable efforts in the direction of research and advice on the constituents, value, and effects of feeding-stuffs.

That they are able to advance much in regard to the latter, whilst only keeping at a moderate level as regards the former, is chiefly due to the lack of a copious yet concentrated field for the exercise of the activities of investigation and research. At present the opportunity for the veterinary surgeon to study matters of zootechny and to collect facts regarding the science are almost unique. Are we taking full advantage of the convenient occasions? It has been well said that everybody from outside (with the exception of the gas inspector and the rate collector) that enters a veterinary surgeon's establishment is in trouble, doubt, or difficulty of some kind. It is the province of the professional man to equip himself fully to succour and comfort these harassed individuals. Our influence on agriculture should always be good and valuable. Let us see to it that we strive ever to be men of full knowledge, capable of giving sound and timely advice on all matters connected with animals.

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A BROAD view of evolution raises a strong presumption that there is no predominance of pain or pleasure, and of good or evil, but that the development of these and other pairs of opposites has been equal and parallel. It follows from this, that birth and death ought to be matters of indifference to us, that the high value we all attach to life is a delusion, and that birth and death are merely devices for maintaining the balance between adaptation and misadaptation, which is necessary for the preservation of the species. The answer to these doubts is, that life is valuable in proportion to the greatness of the positive values which it offers us the prospect of realizing; the life of a free man is of more value than the life of a slave. Here, however, we must remember that life at the same time offers negative values in the same proportion; what the actual resultant value shall be depends entirely for each man upon himself.—From "By-paths in Evolution," by Colonel R. H. Firth, *Journal of the R.A.M.C.*

Selected Articles.

THE EFFECT OF THE CATTLE TICK UPON THE MILK PRODUCTION OF DAIRY COWS.

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[Abridged.]

Introduction.

The common cattle tick, *Margaropus annulatus*, infests the cattle throughout the greater part of Florida, Georgia, Alabama, Louisiana, and Arkansas, large portions of Texas, Oklahoma, Mississippi, South and North Carolina, and small areas in Virginia and California. On account of the enormous losses occasioned by the parasite it has been necessary to quarantine the area infested, so that cattle outside of this area may be protected. Ever since 1906 tick eradication in the infested area has been actively pushed by Federal and State governments, co-operating with citizens of tick-infested regions, to destroy the pest. While the majority of farmers admit some loss, few are aware of its extent, hence the experiments reported in this bulletin were undertaken to bring out the facts, particularly in relation to the effect of the tick on dairy cows.

The cattle tick is an almost exclusive parasite of cattle. While the ticks may mature on horses, mules, and possibly deer and sheep, their control on these animals has proved to be comparatively easy. All ticks come from eggs laid by the adult female ticks. An engorged female tick dropping from a cow completes oviposition in from five days to a week; the eggs hatch as a rule in about twenty-one days in ordinary summer weather; the issuing seed ticks crawl upon the grass and await the coming of cattle upon which they crawl when opportunity offers; they then reach maturity in from twenty-one to twenty-five days.

While maturing each tick abstracts a definite amount of blood from an animal, and to that degree injures it. The quantity of blood abstracted is many times the weight of the ticks when

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grown, for these represent only that part of the solids and fluids of the blood which may be converted into the tissues of the tick, the remaining solids and fluids being rejected. The amount of blood taken by a single tick may be relatively small, but the total amount drawn by thousands of ticks on one cow cannot fail to be injurious. If each tick represents but a drachm, or a teaspoonful, of blood, a few over 1,000 would represent 8 lb. of blood. It is possible that each tick absorbs more than a drachm of blood.

But the greatest disturbance created by the tick seems to be, not in the amount of blood abstracted, but in the fact that it is the carrier of the germ of Texas fever which it transmits to cattle. When cattle that have never become accustomed to ticks are infested they become very sick and usually die. This may occur anywhere, either within or without the tick-infested region. Cattle that survive the ticks usually remain immune to their worst effects afterward. However, as time passes the important fact that no cattle in the quarantined area of the South are ever safe from the effects of Texas fever, either in its acute or chronic form, becomes more and more impressed on those who have to study the affected cattle.

Plan of the Experimental Work.

As the dairy industry is becoming an important branch of southern agriculture it was thought desirable to ascertain the effect of the tick on the milk production and body-weights of dairy cows. Twenty grade Jersey cows* of about average dairy quality were selected in the early part of their lactation periods. They were in fair condition of flesh at the beginning, and all had been tick-infested at some time. The animals being immune to ordinary attacks of tick fever, the results should be applicable to the average dairy herd in the tick-infested areas. These cows were divided into two groups of ten animals each, the two groups being balanced as nearly as possible in regard to milk and butter-fat production, condition of flesh, and size. One group was freed from ticks by spraying with "tick dip B," an arsenical solution used by the Bureau of Animal Industry in the tick-eradication

* The cows and the feed lots used in these experiments were provided by the Anthony Farms Co., Anthony, Fla., of which Mr. E. C. Beuchler is manager and vice-president.

work. Data were taken on only nine cows of this group, as one cow received an injury to her udder which stopped her milk flow early in the test. The other group was kept tick-infested by applying seed ticks at regular intervals. The degree of infestation varied with different animals and with the entire group at different times during the course of the experiment.

The experiment began May 21, 1913, and lasted during a period of 140 days. The milk of each cow was weighed and a sample taken at every milking for a composite fat test at the end of each ten-day period. The body-weights were taken for ten consecutive days at the beginning of the work; thence once every ten days until the last period, when they were taken for ten consecutive days as at the beginning of the work. The weights were taken at about the same hour and under the same conditions each time, so that the extent of fill, both as regards feed and water, would be similar. The treatment of the two groups in all respects other than ticks was as nearly alike as possible.

Feeding.

The tick-free group of cattle were fed as much alfalfa hay as they would eat readily, and enough corn chop, wheat bran, and cotton-seed meal, mixed in the proportions 4:2:1, to maintain the body-weights. The aim was to give the infested group the same kind and amount of feed, but toward the close of the experimental period these cows failed to consume as much hay as the tick-free cows. In order to make the digestible nutrients consumed practically equal for each group, the grain ration of the infested cows was raised 1 lb. for each 2½ lb. of hay refused. Both groups of cows had access to salt and water in unlimited quantities.

The Ticks.

The seed ticks used to obtain the various degrees of infestation in the cattle were the progeny of mature ticks obtained from several sources. The supply of ticks was secured through the co-operation of Dr. Charles F. Dawson, of the Florida State Board of Health, as the local supply was insufficient. Dr. Dawson's first material was collected from Tallahassee, Kissimee, Dade City, and other places in Florida. A few small lots were received subsequently. The earlier adult ticks were collected between April 13 and April 28. The seed ticks or larvæ from

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eggs laid by these emerged between May 22 and June 2 following. On June 12 and 14 two other consignments were received. The resulting broods seemed sufficient to ensure thorough infestation of cattle during the first weeks of the experiment.

A second source of seed ticks was the Anthony Farm cattle not under test. This supply, together with that already mentioned, was sufficient to last until the middle of July by applying them but once a week. These two sources of supply proved to be insufficient, and a third lot was obtained from the Zoological Division of the Bureau of Animal Industry. These were mainly a portion of the original collection by Dr. Dawson, which had been sent by him to Washington and intended for another purpose. One flask of specimens labelled as originating in Texas accompanied these. This Washington consignment was applied during July. As fast as the ticks matured on the experimental cattle they were picked off, and the seed ticks derived from them became available about August 1. From that time on there was an abundance of material.

The time of application of the ticks may be roughly divided into two periods, viz., from June 4 to July 28, in which ticks were applied at intervals of seven or eight days, and from August 1 to September 25, in which they were applied on each alternate day with but two exceptions. The effect of weekly applications was to cause the ticks to ripen in groups covering about five days; the alternate day applications caused a more continuous and intense infestation. The exact fluctuations of this were not determined on account of cessation of gathering ticks when sufficient had been obtained to complete the experiment.

Collections of ticks from the experimental cattle were made twice daily during milking time from June 26 to September 4. This was necessary in order to obtain seed ticks for a continuation of the experiment into the fall months. The deleterious effects of the ticks were less than if they had been allowed to mature on the cattle; but in such case future seed ticks would not have been available. Additional effort to acquire material from other sources demonstrated the futility of depending upon outside sources for seed ticks. As the experiment proceeded it became too late to employ other cows for raising ticks, a plan which would be better if the experiment were to be repeated.

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The count of the ticks made and given in an appended table does not include all that became attached to the cattle, for some dropped off, some were picked off by chickens, and others were licked off by the cattle themselves. Also many incompletely mature ticks were collected which might have added their share of damage to that already produced. The infestation during the earlier period, June 4 to August 5, was practically like a fall infestation in intensity, excepting that the ticks were not maturing equally throughout the week, thus causing milder effects during the time that the ticks matured less rapidly. Infestation on different cows was from slight to gross during the whole experiment. Under farm conditions pasture infestations may occur daily, thus making continuous appearances, such as occurred during only a part of the week in the experiment, and producing consequently more severe injuries. The collecting of ticks was continued until within thirty days of the close of the experiment, when the supply was sufficient to maintain infestation until the completion of the work.

The infestation from August 20 to October 7 was unusually large in those animals which were susceptible to the ticks; in others the infestation was only slight, as throughout the experiment. In the weekly infestation there were three or four broods on the cows at the same time, viz., newly attached seed ticks, week-old, two-weeks old, and, depending on the exact date, maturing ticks. In alternate-day infestation there were eleven broods on at once. On cows which favoured their development one could feel by touch the young ticks that were covered by hair. From the beginning difficulty was experienced in gauging the number of young ticks that should have been put on the cows. In the weekly infestation all the available ticks were used. The effects would not have been different had the same numbers been applied at intervals throughout the week. The infestation would have been less visible, however.

Effort was made to apply about the same number each time, but later application gave better results than earlier ones. While the number placed on the animals was purely a matter of judgment, it is probable that the numbers applied from day to day did not vary so much as did the vigour with which the ticks attached themselves to the cattle. After the seed ticks were applied no changes could be made, and results alone proved the numbers that remained on the cattle.

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The seed ticks were applied by permitting them to crawl on to the cow's hair in various places from the edge of pint fruit jars used in hatching them. Sufficient time was allowed after hatching to permit the seed ticks to harden and become brown. They had been confined in the jars by cotton cloth. This cloth was used later to wipe up the ticks and scatter them over the cattle. In the first period of the experiment the ticks were mainly placed on the backs, bellies, and escutcheons of the cows, but in the second period they were placed more generally over the entire body.

Some of the tick masses became too moist during oviposition and incubation in the wet season, and this caused the masses to adhere and resulted in the death of the larvæ, especially when too many of the adult ticks were put together. Previously many egg masses had been kept too dry, presumably on account of atmospheric conditions and the small number of adults placed in a jar. Later on better conditions were secured by collecting the ticks in paper bags in lots of 200 or 300 and transferring them to the cloth-covered jars when they were nearly hatched.

These methods caused the numbers of seed ticks occurring on the cattle to be purely guesswork. Failure resulted in spite of special efforts to infest those cattle that presented the fewest adult ticks. Such were nearly immune to ticks.

Results of Experiments.

The damage done to the infested cows by the ticks seems to have arisen from two distinct causes: first, a fever incited in some of the cattle at various periods, and, second, loss of blood abstracted by the growing tick.

Fever caused by the Ticks.

The presence of fever on various dates was ascertained. No attempt was made to take daily temperatures, as the matter of taking any temperatures at all was an afterthought rather than part of the plan. One set of temperatures was taken at 9 a.m.; all others at 4 p.m. The temperatures of the tick-infested cattle were higher than the checks and nearly always above normal. The temperatures of the tick-free cattle were also often above normal. This may have been due to moist, hot conditions of the atmosphere, since only in exceptional cases were the temperatures abnormal on cool days.

Blood taken from cows 12 and 13 and observed to run from the tick wounds of cows 15, 17, and 20 in particular was abnormal in being too thin. The red blood clots formed but a small part of the mass. All these animals, also cow 16, were noticed to be visibly distressed as to feelings and respiration on various occasions. Cow 15 alone showed a slight pendulous swelling under the lower jaw. Cows 11, 14, 18, and 19 were infested with but few large ticks and not many visible small ones. Neither were they apparently ill at any time. To what quality these cattle owed their immunity from ticks is not known. They looked more like Jersey cattle than the other ones infested. In colour cow 14 was lemon fawn and cow 19 was light fawn, and the latter's coat

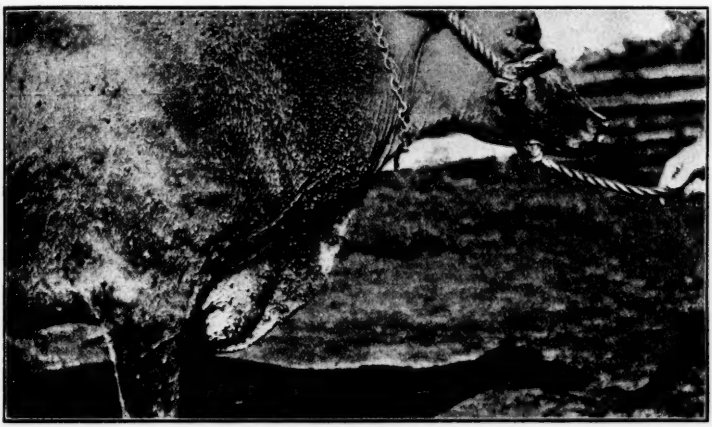

FIG. 1.—Cow No. 20, heavily infested on neck and shoulders. Photo taken September 24, 1913.

was very short and thin. Cow 15, the cow that became most heavily infested, was a large red brindle cow that resembled the Shorthorn or beef type. This cow seemed to resist the effects of the ticks until toward the end of the experiment, but finally failed rapidly in giving milk, and died within a week after the close of the experiment.

Cow 20 was infested almost as heavily as cow 15. She was a large Jersey-like cow of lemon-yellow colour (fig. 1). Her milk failed quite early in the experiment. She presented a dejected appearance for some time, but later recuperated and gained or

held her weight to the end. Externally there seemed to be no reason why ticks developed so much more on her than on cow 14.

Cow 12, a mongrel Jersey with black predominating and white underparts, was the next most infested (fig. 2). She became ill, but acquired the habit of licking herself as clean of ticks as she could and of being assisted by other cows. She seemed to recover from her fever and improved somewhat in condition.

Cows 13, 16, and 17 were infested about alike, but Nos. 13 and

FIG. 2.—Cow No. 12, heavily infested on rear parts. Photo taken July 19, 1913.

17 suffered more from fever than No. 16. There seemed to be no particular difference in the coats of Nos. 13 and 16 sufficient to explain why No. 16 should be less infested. They were red cows of mixed origin and doubtful ancestry. Cow 17 was a very dark cow with white underparts, having a rather fine Jersey-like head. The sickness reduced her milk flow much more than was the case with No. 13. As a whole, the light fawn-coloured cows seemed to resist ticks better than the dark-coloured ones.

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The sickness in the cattle was not entirely due to the number of ticks, for cows that had fewer ticks by far than cow 15 were sick much earlier. It has previously been stated that one of the sources of ticks was the Anthony farm. This farm sustains a large dairy, and frequently the herd is replenished with fresh milkers brought from Georgia and the surrounding country. According to the superintendent, many go through acclimatization or Texas fever. It is quite probable that ticks from some of the acclimatized animals furnished the first protozoa (piroplasma) to produce disease in the experimental animals; it may be that afterwards ticks from sick cows in the experiment transferred the disease to other cows. While all these cattle were used to ticks, it is quite evident that they were not thoroughly immune to fresh attacks of disease, whether due to blood-letting or piroplasma parasitism. That immunity is a variable quantity is accepted by many southern cattlemen who have studied and had experience with traded cattle.

The ten check cattle remained free from ticks through keeping them in a separate pen and stalls; otherwise they were under similar conditions as the infested cattle. Although they were separated from the tick-infested group in the stable by the mangers only, and later turned out into a small field on account of the muddy condition of the barn lot, there was insufficient manifestation of small ticks to show pen and yard infestation. However, it was thought necessary to spray these cattle on occasions because of a few scattered ticks which were presumably carried to them on the rag with which the udders were washed. Spraying was followed for a day or two by a diminished quantity of milk, after which the normal flow re-established itself. The spray used was arsenical tick dip B, a concentrated solution which, when used in prescribed dilution, produced a subsequent slight exfoliation of the epidermis.

The deleterious effects of the ticks were not so apparent in the experiment as they would have been had more ticks been developed early in the experiment. In that case early losses would have been reflected throughout. It is probable that excessive invasions of ticks on freshening cows in spring reduces their milk flow by fully one-half before the lactation period is ended.

An attempt was made to put on about the same number of

seed ticks at each application, so that the number applied from day to day was probably fairly uniform. Seed ticks secured from adult ticks from outside sources seemed to be less vigorous and to have more difficulty in attaching themselves to the cows than those more recently obtained from ticks that had matured on the Anthony cattle, so that fewer of them matured, and consequently less damage resulted than when the Anthony ticks were used. This apparently low vitality of the seed ticks obtained from outside sources, together with the light infestation obtained at the early part of the work, delayed any definite results until toward the latter part of the experimental period.

The cows used were so-called immune, yet all the tick-infested group except the four lightly infested ones suffered from attacks of fever at different times during the experimental period. This was not due entirely to the number of ticks maturing upon these animals, for cow 15, which showed the heaviest infestation throughout the entire period, was one of the last to suffer from an attack of fever.

Effect of Ticks on Milk Production and Body-weight.

Although each of the cows used in this work had been tick-infested at some time, the individual variation in the degree of infestation that could be obtained was so wide that two sub-groups were made of four animals each, one of which will be called the lightly infested and the other the heavily infested group. These sub-groups show the effect of varying degrees of infestation upon the body-weights and milk production of the cows in a manner more marked than when the two entire groups are compared. In the discussion which follows only the summaries of groups are given. Complete data for each cow will be found in the appendix.

Comparison of Tick-free and Tick-infested Cows (entire groups).

At the beginning of the experimental period the two groups produced practically the same amount of milk—the cows of the tick-free group producing an average of 176·2 lb. during the first ten-day period, and those of the tick-infested group an average of 177·9 lb. During the final ten-day period the cows of the tick-free group produced an average of 92·1 lb. of milk, a decrease of 47·7 per cent. from their production during the initial

period, while the cows of the tick-infested group produced an average of 60·6 lb. per cow, a decrease of 65·9 per cent. when compared with their first ten-day period. It should be noted especially that while the tick-infested cows produced 1 per cent. more milk than the tick-free cows in the beginning, they produced only 65·8 per cent. as much during the final period. The two groups consumed practically the same amount of feed during the entire period. The percentage of fat in the milk of each group increased toward the close of the experiment, that of the infested group showing a slightly greater increase.

At the beginning of the test the tick-free cows weighed on the average 719·2 lb., and the tick-infested 707·2 lb. During the experimental period each group increased in body weight, but the increase of the tick-free group was greater than that of the tick-infested. During the final ten-day period the cows of the tick-free group averaged 763·4 lb. in weight, an increase of 6·1 per cent., and those of the tick-infested 732·9 lb., an increase of 3·6 per cent. from the initial weight.

In making this comparison it should be remembered that during the entire experimental period the two groups consumed practically an equal amount of nutrients, and that toward the latter part of the experimental period the milk production of the tick-infested group was considerably decreased, so that this group was fed an amount in excess of that required for milk production. Presumably this excess of food would tend to make flesh and thus offset any detrimental effect that the ticks would have upon the body-weights.

Comparison of Tick-free and Heavily Infested Groups.

Four cows in the tick-infested group were soon found to be more easily infested than the remaining six. A gross infestation of these four cows was obtained early in the experimental period and was maintained throughout the test. At different times all four suffered from attacks of fever, with an almost total loss of appetite and a falling off in milk flow. One, which suffered from an attack of fever at the end of the experimental period, died shortly after the close of the work.

The heavier the degree of infestation, the greater proportionately the injury. This is likewise proved to be true when the body-weights of two groups are compared.

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Comparison of Tick-free and Lightly Infested Groups.

While four cows of the tick-infested group proved to be easily infested, another four of the same group proved to be very resistant. The immature ticks were applied to these four cows with the same care and in as large numbers as they were to the heavily infested animals; in fact, extra efforts were made to obtain a heavy infestation upon these resistant animals. However, at no time during the experimental period were any of the four so heavily infested that the degree of infestation could be classed as gross, and for the greater part of the period none of them was carrying mature ticks. The decrease in milk production was more than in the tick-free cows, but considerably less than in the heavily infested animals.

Comparison of Lightly Infested and Heavily Infested Groups.

While the heavily infested cows produced more milk during the initial period and through the greater part of the experiment, they also consumed more feed than those of the lightly infested group. At the beginning of the experimental period the four heavily infested cows produced an average of 212·6 lb. of milk, while the four lightly infested cows produced an average of 157·5 lb. during the same ten-day period. During the final ten-day period the heavily infested cows produced an average of but 54·5 lb. of milk, a decrease of 74·3 per cent. from their production during the initial period. During the same period the lightly infested cows produced an average of 68·6 lb. of milk, a decrease of 56·4 per cent. from their production during the first period. While the heavily infested cows produced 35 per cent. more milk than the lightly infested during the initial period, they produced only 79·4 per cent. as much during the final period. When the two groups are compared with the tick-free groups, it is seen that the lightly infested group produced during the final period of the experiment 81·4 per cent. as much milk as the tick-free, while the heavily infested group produced by 57·6 per cent. as much. A comparison of the body-weights of the two groups shows the heavily infested with an average weight per cow of 700·7 lb. during the initial ten-day period, which decreased to 691·4 lb. per cow, or 1·3 per cent., while the lightly infested cows, with an average weight of 694·4 lb., increased to 736 lb. per cow, or 6 per cent.

No figures are given on cost of milk production, as the aim was merely to measure the effect of tick infestation on yield of milk and body-weight. As the cows were kept in comparatively small enclosures, the cost of milk production was higher than under ordinary conditions when cows are on pasture.

Effect of Spraying or Dipping in an Arsenical Solution upon the Yield of Milk.

At four different times during the experimental period the cows of the tick-free group were sprayed with tick dip B, an arsenical solution. This was done to keep the tick-free cows absolutely free from ticks. Each spraying caused a temporary reduction in the milk yield. The average yield for the first day after each spraying, when compared with the average of three days preceding spraying, showed percentage reductions in each case as follows: 8·7, 27, 8·3, and 5·7 per cent. It will be noted that the reduction was much the highest for the second spraying. On the day prior to this spraying and for two days thereafter timothy hay was fed, owing to a shortage of alfalfa. This, no doubt, had its influence on the milk yield, as indicated in the excessive shrinkage at that time. From three to five days were required for the cows to return to their normal production. The average of five days after each spraying compared with the average of three days preceding spraying showed reductions, respectively, of 6·2, 21·7, 4·5, and 7·6 per cent. Disregarding the second spraying, the average reduction for five days was 6·1 per cent.

These results with spraying are similar to those obtained with dipping during the 165-day test conducted by J. H. McClain, of the Dairy Division, Bureau of Animal Industry, at Summerville, S.C., in 1912. In this experiment ten cows were dipped seven times with a solution of tick dip B, the dippings coming at intervals of about twenty-one days, with an average decline in milk production, for two days, of 10·6 per cent. after each of the seven dippings. But apparently the cows became accustomed to the dipping process, for there was no appreciable decrease in the milk flow after the first four dippings except the natural decrease due to the advance in the lactation period. The average decline in production was approximately as follows: After each of the first four dippings, milk, 14·8 per cent.; fat, 8·9 per cent.; after each

of the last three dippings, milk, 1·9 per cent., but an increase of 10·6 per cent. in yield of fat.

That the heavily infested cattle in our experiments yielded fully 40 per cent. less milk than the check animals at the close of the experiments, and that even those lightly infested gave less by 25 per cent., has been heretofore recorded. Conversely, we may infer that the check cows in this experiment and those regularly dipped in the Summerville experiment gave this additional quantity of milk on account of being kept free from ticks. Had this freedom been obtained without the use of arsenical dips, it is quite certain that an amount of milk equal to 10·6 per cent. during one-tenth of the time in the Summerville experiment, and to 6·1 per cent. during one-seventh of the time in our experiments, would also have been saved from loss on account of the ticks. These differences emphasize the good results of the use of arsenical dips, and above all, of the necessity for the complete eradication of ticks so that the remedy, which of itself temporarily reduces the flow of milk, will be unnecessary.

Summary and Conclusions.

The cattle tick has a decidedly injurious effect upon supposedly immune dairy cattle, the extent of the injury being largely dependent upon the degree of infestation. The effect is more pronounced upon the milk production than upon the body weights when a sufficient supply of food is given.

At the beginning of the test the tick-free and tick-infested groups gave practically the same amounts of milk; at the close the tick-infested gave only 65·8 per cent. as much as the tick-free.

The tick-free group gained 6·1 per cent. in body-weight; the tick-infested 3·6 per cent.

Spraying or dipping tick-free cattle in an arsenical solution causes a marked though temporary decrease in milk flow. In this experiment there was an average reduction of 6·1 per cent. from the normal milk flow for a period of five days following each of the four applications of the arsenical solution.

Resistance of cattle to infestation by the tick is a variable quality. Of the ten animals in the tick-infested group, four became grossly infested; two more so than the average, and the remaining four but lightly infested.

The death of cow 15, due to excessive tick infestation, and

various recurrences of fever in the other animals, emphasizes the extreme hazard of cattle being continuously subjected to these losses by the tick. Cow 15 was one of the best of the tick-infested group, and represented at least a 10 per cent. loss from the capital invested in tick-infested cows. Furthermore, the losses observed in this experiment were sustained on rations sufficient to maintain body-weights. It is thought that had there been but a scant supply of food, as sometimes occurs when cows are on pasture, the tick-infested cattle would have suffered earlier and probably to a greater degree than they did. The losses in this case were in spite of a good maintenance ration. It is probable that much of the spring losses in cattle now laid to starvation, due to lack of pasturage, is materially aided by blood depletion due to ticks, and that repeated dippings would save many cattle otherwise lost.

These experiments are not extensive enough to furnish an exact measure of the amount of decrease in milk flow due to infestation, but they show that the losses are considerable and vary in immune cows largely in proportion to the extent of infestation, since in all cases the milk flow decreased faster in the heavily infested than in the lightly infested cows. This is additional evidence that the tick is a great hindrance to profitable dairying in the South. Even in so-called immune cattle, ticks cause irritation of the skin and withdraw blood that otherwise would produce milk or meat.

Fever-producing parasites are present in the blood of cattle once infested by ticks, though they may be so few in number that no symptoms of the disease are apparent. The danger from them lurks there, nevertheless, for under certain conditions the parasites may multiply so rapidly as to cause marked disease or death, or they may be transferred by ticks to uninfected animals. Thus the tick constitutes a source of danger, and should be exterminated. Furthermore, eradication must be by co-operative, concerted action. One farmer may free his premises of ticks, but reinfestation is liable to occur at any time from neighbouring farms or strange cattle, unless the entire community is free from the tick.

The only means of preventing losses by ticks is through disinfection and clean pastures. While dipping may temporarily diminish the quantity of milk given, in the long run it largely conserves the flow of milk. The arsenical solution should be used to frustrate the great dissemination of ticks during their most favourable season. In infested areas where there is no concerted effort to eradicate ticks it may not be wise to use the solution on slightly infested milch cows.—*Bulletin, U.S. Department of Agriculture.*

GENERAL PRINCIPLES TO BE OBSERVED IN THE INSPECTION OF THE CARCASES AND ORGANS OF TUBERCULOUS ANIMALS WITH A VIEW TO DETERMINING THEIR SAFETY AS ARTICLES OF HUMAN FOOD.*

By HJ. HANSSON.
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UNQUESTIONABLY tuberculosis ranks first amongst the morbid changes which occur in the carcases of animals, and plays a more or less important part in the modern inspection of meat. Statistics from public slaughter-houses and other controlling centres for the inspection of meat show that tuberculosis is the cause of millions of kilos of meat being withheld yearly from consumption. It is therefore not to be wondered that on the part of experts the judging of tuberculous meat will always be a subject for their unceasing attention. Quite recently several of the most prominent amongst the veterinary hygienic profession have devoted much time and trouble to the solution of the problem of judging of tuberculosis. The investigations made have given us the certainty that to a great extent the old principles for the judging of meat of a tuberculous animal must be dispensed with.

The fundamental question of the whole judging of tuberculosis is if the cattle tuberculosis is transferable to men and if it can produce illnesses of a serious nature in them. Since the German and English tuberculosis committees have clearly proved the transferability of cattle tuberculosis to human beings, and, above all, since the English committee has established that almost 50 per cent. of the investigated cases of intestine or mesentery glands tuberculosis in children, which have proved fatal, the tubercle bacilli producing the illness have solely been those of the bovine type, it will be naturally understood that all meat of tuberculous animals cannot be handed over, but that some forms of tuberculosis demand taking far-reaching measures for the prevention of such meat being circulated without any restriction.

When must the meat of a tuberculous animal be considered as unfit for human food? Before I can enter into this question

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I will lay before you the principles which during the last years have generally been accepted. Since Weigert from a purely pathologic-anatomic point of view has defined the conception of local and general tuberculosis, the merit of having brought order and clearness in the judging of tuberculous meat is due to Johne, who established the principle: The generalization of tuberculosis proves that the infective matter spreads in the main circulation of blood and infects the meat, therefore it must be considered as harmful for human food; however, the pure local tuberculosis does not prevent the meat from being handed over after the infected organs or parts have been destroyed. After it had been proved through the investigations of Nocard that tubercle bacilli circulating in the blood retain their virulence at the most five or six days, and that consequently in case of only one generalization for so long a time back, that the process of generalization must be considered as completed, no tubercle bacilli can circulate in the blood in such a case, and after it had been proved by Hartenstein that tuberculous changes in one part of carcase must not necessarily be a sign of the whole carcase being injurious to health, the judging of the same on the suggestion of Ostertag was mitigated thus, that in case of such a completed generalization only that part of the carcase with the lymphatic glands belonging to it, where tuberculous changes had been ascertained, must be considered as injurious to health. These principles have upon the whole been employed up to now. Accordingly we pay more attention to the presence and degree of such tuberculous changes, which point out that an infection of the main blood circulation has once taken place, and also upon the places of these changes.

This basis for judging should naturally be correct under the condition that the tubercle bacilli, which have once entered the blood circulation, are either deposited in the muscles or continue to circulate in the blood with retained virulence.

Now investigations during the last years have clearly and distinctly shown that the muscles and the blood of tuberculous animals are, as a rule, free from tubercle bacilli even in such a case where distinct signs of the generalizing of the tuberculosis were evident, contradictory to what has been said before. On the other hand, several investigations have shown that any tubercle bacilli which have entered the blood cannot generally be found there longer than eight to nine days at the utmost after the inoculation.

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The signs of generalization are, therefore, not so much to be considered as a proof of the blood, and thus also the meat containing tubercle bacilli, but more as a proof, that in the organism can be found one or several centres of tubercles of such a propensity, that for a longer or shorter time back they had caused the generalization of the tuberculosis. It is therefore the duty of the practising meat inspector, after having ascertained the presence of tuberculosis with signs of generalization to endeavour to find the source which has caused the generalization, and also to make sure if any tubercle bacilli continuously escape into the main blood circulation and consequently infect the carcase. I believe that it is hardly possible to ascertain this in every case. However, we must through very numerous experiments intended to ascertain by various forms of tuberculosis, if the blood or the meat contains tubercle bacilli, come quite near the truth, and in this way obtain a better regulative for judging of tuberculous meat than that used up to the present. In the latest veterinary literature we see several investigations with the purpose of clearing up which forms of tuberculosis are intending to continually let out tubercle bacilli in the main blood circulation, as those of Bongert, Nieberle, Ishiwara, and others.

However, most of them have not tried to solve the question to the fullest extent, but have been satisfied with investigating the one or the other form of tuberculosis and their propensities. For that reason, in the endeavour to lay before you my views with regard to the judging of tuberculous meat, I principally base myself upon the results of the investigations which, during the years 1912-13, have been made by my colleagues Wall, Hülphers, and Brandt in the laboratory of the public slaughter-house of Stockholm. In the yearly report for the said years of Stockholm's slaughter-house detailed descriptions are given of these works, whose results form the basis of the new regulations for judging the meat with tuberculosis issued by the Royal Board of Medicine in Sweden.

The 153 investigations which have been made comprise carcases of full-grown cattle, calves and pigs with tuberculosis of various form and extent, and have been executed in the following way. From the right anti-ventricle of the heart, left ventricle of the heart, or from the axillary vessels, in most cases 2 c.cm. of blood were under the precaution of sterilizing sucked

up through a suction pipe, and in order to avoid coagulation mixed with the same volume of 1 per cent. natrium citrate bouillon. This mixture is then injected subcutaneously on two guinea-pigs, each the half. After six or seven weeks they were tested with tuberculin in one of the footsoles, and those who reacted were killed. When both inoculated guinea-pigs showed negative reaction, one of them was killed for the purpose of a *post-mortem* examination. If through this examination tuberculous changes were to be pointed out, microscopic spread preparations were continuously made, and only after tubercle bacillus having been discovered by colouring per Ziehl-Neelsen the diagnosis of tuberculosis was cast.

Out of the twenty-seven cases of tuberculosis in cattle which were investigated during the year 1912, in ten cases the blood contained tubercle bacilli (= 37 per cent.). In three cases the blood from the right anti-ventricle of the heart was used as inoculating matter, out of which one case of highly developed tuberculosis of the lungs and liver combined with centres of the size of a pea in one kidney gave positive result. In four cases of highly developed tuberculosis of the lungs inoculation was made with blood from the axillary vessels, and in two of these cases one of the guinea-pigs was tuberculous. In the one case it was a matter of highly developed acute miliary tuberculosis of the lungs, together with tuberculosis of the pleura and peritoneum, but without signs of generalization. In the other case it was a chronic caseous pneumonia, together with highly developed tuberculosis of the pleura and peritoneum, combined with tuberculosis of the liver. In twenty cases of highly developed tuberculosis of the lungs the blood from the left ventricle of the heart was used as injecting matter, and in seven of these cases the result of the injection was positive, out of which in one case it was a matter of highly developed acute miliary tuberculosis in the lungs and kidneys; in three cases there was a widely extended chronic caseous pneumonia with tuberculosis of the pleura and peritoneum, together with signs of generalization in the kidneys or the udder; in three of the positive cases the tuberculosis was a local extended caseous pneumonia; in two of the cases, combined with tuberculosis of the pleura. Out of the thirteen cases where the injections with blood from the left ventricle of the heart were negative, it was a matter of one case

of highly developed acute miliary tuberculosis in the lungs with highly developed tuberculosis of the liver, combined with tuberculosis of the pleura and peritoneum. In three cases there was an extended chronic caseous pneumonia with signs of generalization in the kidneys or bones combined with tuberculosis of the pleura in two cases. In seven cases it was a matter of local tuberculosis with extended chronic caseous pneumonia, combined with extended tuberculosis of the pleura in six cases and of tuberculosis of the liver in one case. In two cases finally there was a slight caseous pneumonia, combined with tuberculosis of the kidneys in one case.

In all the investigated cases the tuberculosis produced centres varying in size and age, and frequently with uneven jagged edges.

In five of the ten cases with positive results of injection the tuberculous centres were hard and calcinated, whilst the others produced so-called soft centres, so that the latter cases cannot be regarded more than the other forms of lung tuberculosis spoken of, that the blood contains tubercle bacilli.

The investigations made in 1913 gave a positive result in a less number of cases than the researches of 1912, and its explanation is possibly that in the latter year, as a rule, the blood of the heart has been used as material of investigation, whereas in the former it was the blood from the axillary vessels which, as known, contains a mixture of arterial blood with venous blood, this being prevalent in a greater degree. It may be possible that a number of the tubercle bacilli, which the heart-blood contains, will be deposited in the capillaries of the extremity, so that the blood of the axillary vessels, which to a greater extent consists of venous blood, contains a smaller number of tubercle bacilli, and that consequently only the infections of a high degree give positive result. As the results obtained are intended to serve as a basis for judging the fitness of meat for human consumption, it must be only the serious cases which we have to look for. Researches of Findel, Reichenbach, and Alexander have, as known, proved that a far greater quantity of tubercle virus even in so susceptible an animal for tuberculosis as a guinea-pig is required to produce tuberculosis by feeding than it is by subcutaneous injection. Under such circumstances the blood of the axillary vessels, supposing that it contains a smaller number of bacilli than the blood

from the left ventricle of the heart, must be more suitable as material ot researches, because a positive result through the weaker blood-infections, which are certainly harmless, is in this way to be avoided.

As the tables of the inoculations with the axillary vessel blood of cattle show, the tuberculosis has shown signs of generalization in meat lymphatic glands in thirty-two cases and such in the bones in eleven cases, but in no case the material of investigation was tuberculous. In thirty-one cases with tuberculosis of the pleura in a slight degree the material of inoculation was not tuberculous. In forty-two cases the tuberculosis of the pleura was of a high degree, and out of these seven (= 16·67 per cent.) gave positive result of inoculation. In three out of these cases the animals were in bad condition. Eighteen cases of tuberculosis of the liver gave negative result. Out of seven cases of tuberculosis in the substance of the udder two, or 28·57 per cent., showed positive result of inoculation. In both cases two fourth-parts at least of the udder were attacked. Out of fourteen cases of tuberculosis of the kidneys of a slight character the material of inoculation was tuberculosis in one case (= 7·14 per cent.). Six cases of tuberculosis of the kidneys of a high degree showed a positive result in three cases, or 50 per cent. Out of these cases two showed in the substance of the kidneys numerous centres smaller than a hemp seed.

Out of sixty-eight cases with tuberculosis in the lungs of a slight degree four, or 5·88 per cent., gave positive result. The lung tuberculosis was of a high degree in thirty-two cases, and three, or 9·38 per cent., of them were positive. Eighty-three cases, the animals being in good or second-rate condition, gave positive result in four cases, or 4·82 per cent., while fourteen cases, the animals being in poor condition, showed material of inoculation carrying tubercle bacilli in three cases, or 21·43 per cent.

As a general judgment it may be said that these researches, as well as the most of other authorities in the later years, show that it is only the cases of a more highly developed tuberculosis, which must be considered as the producer of blood and meat containing tubercle bacilli. Indeed, the one under No. 11 described case with a positive result of inoculation with the blood of the axillary vessels of a calf with extended tuberculosis of meat lymphatic

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glands, but without tuberculosis in the substance of an inner organ, makes an exception. Where the reason for the infection of the main blood circulation in this case is to be looked for is impossible to say.

Amongst the various forms of tuberculosis, it seems that it is especially the more serious acute forms of tuberculosis of the lungs and of the kidneys and, perhaps, even of the udder, which seem to indicate that the blood contains tubercle bacilli. So the tuberculosis of the lungs must be considered as being acute in a high degree if the larger part of the substance in both lungs are full of close sitting centres in size of a hemp seed or smaller, or if, as to pigs, the substance of the lungs to the volume of at least twice the heart lobe in grey and indurated without caseous centres being noticeable to the naked eye, but, if such are visible, they are not larger than a hemp seed. The tuberculosis of kidneys must be considered as being acute in a very high degree, if numerous centres in size of a hemp seed, or smaller, are present in the substance of the kidneys. However, I do not consider that these forms of tuberculosis are alone sufficient to give a reason for the judgment of meat of a strict nature, as they do not in any way indicate the blood in every case of such a tuberculosis being the carrier of bacilli. If, however, highly developed tuberculosis of the lungs or of the kidneys is combined with tuberculosis in a high degree of the udder or tuberculosis of bones, of joints, or of the meat lymphatic glands, showing that the blood has really been the carrier of tubercle bacilli, there is every reason to suppose that the infection of the blood is without doubt continuously recurring, and then we are quite justified in preventing the meat with such tuberculosis changes being sold. The meat, however, of an animal in good or second-rate condition can be sold under the declaration, Freibank—of bearing the safety-stamp or any other mark of the hygienic inferiority of the meat after it has been sterilized and the organs and the affected parts have been thrown out. Even the highest developed forms of tuberculosis—emaciation not being present—do not prevent the meat being fit for human consumption after such a treatment as aforesaid. Such meat offers to all certainly no danger with regard to tuberculin to men.

If the tuberculosis is accompanied by emaciation, then, in any case, the meat is to be considered as unfit for human consumption,

and must be thrown out, no matter whether the tuberculosis is highly developed or not.

I come finally to the question, what we must do with regard to judging of organs with tuberculosis. I wish to remind you that the researches which have been made for the purpose to ascertain the presence of tubercle bacillus in tuberculous organs, in the most cases have shown bacteria even in such a case, where it was a matter of tuberculosis only in the lymphatic glands belonging to that organ. On the other hand, it is clearly proved that if tuberculous changes have been ascertained in an organ lymphatic gland, we never can be sure that there are no tuberculous centres in the substance of the organ. Under such circumstances every organ, as well as the corresponding lymphatic glands, as it will certainly be understood, must be considered as being unfit for human consumption as soon as tuberculous changes in either the organ itself or in its lymphatic glands have been ascertained.

From what I have said above, and also taking in consideration the researches made in Stockholm's public slaughter-house, I consider that we, in determining the safety of the carcases and the organs of tuberculous animals for human consumption, must adhere to the following principles, which are almost identical to the regulations recently established for that purpose bv the Royal Swedish Board of Medicine:—

(1) Only the tuberculously changed organs or parts can be considered as being unfit for human consumption, when Nos. (2) or (3) are not applicable. An organ is to be considered as being tuberculous, if tuberculous changes are ascertained in either the substance of that organ or in the lymphatic glands belonging to it.

(2) As unfit for human consumption must the carcase as a whole be considered (meat, bones, fat, intestines, and blood) of an animal with tuberculosis combined with emaciation.

(3) The carcase of an animal as a whole may be considered as being safe for human consumption after being sterilized, and after the destruction of the organs and of the changed parts in cases of:—

(*a*) No calcinated tuberculous changes in three or more meat lymphatic glands in different fourth-parts.

(*b*) No calcinated tuberculous changes in a meat lymphatic gland, combined with highly developed acute tuberculosis of the lungs, or highly developed acute tuberculosis of the kidneys.

(*c*) Tuberculous changes in one bone or more, or in one joint, or in more, combined with highly developed acute tuberculosis of the lungs or highly developed acute tuberculosis of the kidneys.

(*d*) Highly developed tuberculosis of the lungs combined with highly developed acute tuberculosis of the kidneys or of the udder.

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Clinical Articles.

REPORTS OF CASES TREATED WITH POLYVALENT SERUM.

By Monsieur L. CUVILLIER.

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Case 1.—Chestnut mare, 5 years old.

February 4.—The animal was sent to us. The four limbs, but more especially the posterior ones, were tumefied and œdematous. The voluminous swellings reached up to the elbows and thighs. The pituitary and oculary mucosæ were covered with petechiæ. There was no œdema of the face. The animal moved with difficulty on account of the restraint to the play of the articulations. Temperature, 38·9° C. The animal was isolated in a box in the infirmary. Anarsarca was diagnosed.

Treatment.—Bicarbonate of soda 30 grm., sulphate of soda 30 grm., calomel 1 grm.

February 5.—No change. Animal depressed; sulks at food. Temperature, 40° C. Same treatment as the day before, with the addition of 25 grm. salicylate of soda.

February 6.—The mare was downcast. The swellings more voluminous; the right hind limb moved like an inflexible post. Slight muco-purulent and sanguineous discharge from the nostrils. Petechiæ increasing in dimensions. The general condition aggravated. Temperature, 40° C. Same treatment without the calomel.

From February 7 to 24 little change. Swellings always extensive. Animal less depressed. Appetite all along capricious. Fever diminished. Extremes varying between 39·1° and 38·2° C.

February 25.—General state about same. Appetite better. Ecchymoses of the pituitary partly gone, but on two faces of the right hind limb gangrene of the skin involving the front of the hock and the lower part of the shank. The wounds were treated with warm antiseptic solutions and dusted with boric acid. Internal treatment the same.

February 26.—The wound of the right hind limb increased in length, width, and depth. Exudation of stinking pus permeating

the box with a bad smell. Gangrenous wound on internal face of left hock. Same treatment.

March 3.—Wounds increased in size. At the level of right hock solutions of continuity communicate. The animal in attempting to lie down falls on the ground. Slings necessary to raise her. Appetite good. Temperature, 38·8° C. Locally, after cleansing with physiological water, some polyvalent serum (Leclainche and Vallée) was injected with a Pravaz syringe. The needle was directed into the depths of the depressions with a view to covering up as much as possible the mortified tissues with the serum. Externally the wounds were equally damped with serum. Afterwards they were covered up with a light layer of wadding. Same treatment internally, repeating the calomel.

March 3 to 6.—Little modification. Less smell, showing the pus to be less infected. No change in aspect of the pus, but a little less in amount. Same treatment.

March 7.—Wounds no longer suppurate. Tissues react freely, have become rosy, and are covered with little buds of cicatrization. Swellings of the limbs diminished. Same treatment.

March 8 to 12.—Assisted regular cicatrization. Swellings of limbs less by one-half. Internal treatment discontinued. Same local treatment.

March 13 to 15.—Animal out of danger. Appetite normal. No fever. Lies down and gets up. Swellings of limbs disappeared. Wounds completely cicatrized. No anfractuosities and depressions on the right hind limb. A small wound on its internal face the size of a two-franc piece. On the external face wound diminished by half, only 5 cm. long and 3 to 4 cm. wide.

March 16 and following days wounds cleaned and dusted with dry pulverized polyvalent serum.

March 20.—Mare returned to battery, as she was considered cured. We saw her again on several occasions. Cicatrization terminated normally.

Case 2.—Black mare, 9 years old, one of a team.

Seen on February 19, 1915, the animal showed on the upper edge of the neck a handsbreadth in front of the withers a complete division of the skin and deep subjacent tissues to the depth of 4 to 5 cm. This mare had got a cord over her neck and, dragging back on it, had caused the wound mentioned. The two

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surfaces of the wound were covered with dry exudate, bleeding in some places. Some shallows enclosed clots of blood beginning to suppurate. All the region inflamed and painful.

Treatment.—Careful disinfection of the wound with a warm solution of potassium permanganate 1 in 1,000.

February 20.—Swelling and suppuration of the region increased. Wound treated with a warm solution of sublimate 1 in 1,000.

February 21.—No improvement. Some bits of mortified tissue removed. Neck moved with difficulty. Animal eating well.

February 22 to 24.—The state of the wound aggravated. Abscess formation commencing above the wound. Appetite lost. Temperature, 39° C. Wound disinfected twice daily with different antiseptics: solutions of sublimate 1 in 1,000, pot. permang. 1 in 1,000, oxygenated water, 1 per cent. cresol. Painful region smeared with basilicon ointment.

February 25.—State aggravated. Pus in the abscess evacuated. Injected cavity with pot. permang. solution, which escaped into the wound below. Temperature, 39·4° C.

February 27.—Leclainche and Vallée's serum used. After washing with physiological water, injected the fistulous tracks with an ampoule of 5 c.c. of serum. Another 5 c.c. of the serum was spread equally over the original wound. With a view of allowing a longer contact of the serum with the morbid tissues, the solutions of continuity were at the same time protected with a thin layer of hydrophile wadding.

February 28, March 1 and 2.—Same treatment repeated, swelling disappearing, flow of pus declining, so that on March 2 it was almost negligible.

March 3 and 4.—Wound healing; neck moved freely. Same treatment on both days.

From March 5 to 10 wound attended to daily. On March 10 only a slight wound, filling up, and about 4 cm. long and ½ cm. wide. Animal returned to the battery.

On March 11 and following days wound dried and dusted with dry and powdered polyvalent serum.

March 18.—Animal completely cured.

Case 3.—Light roan gelding, 6 years old.

February 25.—The animal was shown to us on visiting. Behind the withers, at the level of the dorsal spine, there was

a wound of the following dimensions: 10 cm. long and 4 cm. wide. This solution of continuity was due to the bad fitting of the surcingle holding the rug on the animal.

Pus, which ran away copiously, was of a bad character, yellowish-red in colour, and contained particles of mortified tissue. The edges of the wound greyish, no granulating. The centre greyish-green. All the region swollen, hot, and painful. The supraspinous ligaments and apophysis of a vertebral spine could be seen with the aid of a grooved probe. The wound was treated with the polyvalent serum, after cleaning with physiological warm water, by means of local application of the serum and the application of layers of hydrophile wadding.

From February 26 to March 10 the wound was treated exclusively with the serum, and all swelling, pain, and pus formation gradually declined. On March 11 the serum was discontinued, and a solution of 1 per cent. picric acid used as a keratinizing agent.

March 15.—Only a cicatrix at the wounded place. Animal discharged for service.

Case 4.—Chestnut mare, 8 years old.

March 9, 1915.—Suppurating wound on the withers 5 cm. long and 3 cm. wide. All the region painful and swollen. After bathing with warm water points of necrosis could be seen. Tissues atonic, no granulation. Pus flowing from the wound abundant, thick and yellowish. After cleaning the wound with physiological water polyvalent serum was applied, and the wound covered with a thin layer of hydrophile wadding.

From March 10 to 29 the wound was treated daily with the serum and gradually improved, as evidenced by lessening of pain, swelling, and pus formation. Dusted with dry serum on the 20th, the animal was discharged cured on March 25.

Case 5.—A chestnut bay mare, 6 years old.

March 20 the animal showed a contused suppurating wound the size of a two-franc piece behind the withers. Immediately in front of this was a gangrenous piece of skin in process of elimination. All this region was swollen, hot, and painful. After cleaning with salted warm water polyvalent serum was introduced, and a thin layer of wadding put on as a cover. The wound did well with serum treatment up to March 26.

March 27.—Large fleshy buds appeared on the surface of the

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wound. These were excised, and the wound dusted with alum and sulphate of copper powder.

March 29 to April 5.—Cicatrization finished. The wound powdered with dry serum.

April 6.—Discharged cured.

Case 6.—A bay saddle gelding.

This gelding had a dry gangrenous patch of skin on the withers the size of a five-franc piece which was sloughing at the edges. The region was painful, hot, and swollen. The lesion was due to excessive and prolonged saddle pressure. To facilitate the elimination of the dead part all the area was dressed with camphorated ointment. By continuation of this treatment the sitfast came away on March 30, and the resulting purulent cavity was dressed daily with the serum up to April 7. On April 8 the wound was powdered with dry serum, and on April 12 the animal was discharged cured. Naturally, the saddle pressure had to be remedied.

Case 7.—Dappled grey mare, 7 years old.

March 29.—Showed a wound behind the withers caused by pressure of the surcingle on the dorsal spines. A dry and dead piece of skin removed caused much pus to flow away. The wound was cleaned and camphorated ointment applied.

On March 11, after cleaning the wound with physiological water, two fistulous tracks were found on each side of the withers 6 cm. long and not communicating. Pus streaked with blood flowed away. The openings of these fistulas were enlarged, their tracks cleansed thoroughly, and they were injected with 9 per 1,000 salted warm water. After drying they were injected with polyvalent serum, and the external wound also dressed and the wound covered with wadding.

March 12.—Suppuration intense. Wound cleansed with salted water showed improvement. The pus discharged from the wound and the fistulas was grumous, flocculent, and contained much mortified tissue. From March 12 to the 19th the fistulas and wound were treated with the serum, and after dusting with dry serum until March 24 the mare was able to resume duty.

—*Revue Générale de Médecine Vétérinaire.* G. M.

HYDATID DISEASE IN A DOG.

By H. A. REID, F.R.C.V.S.
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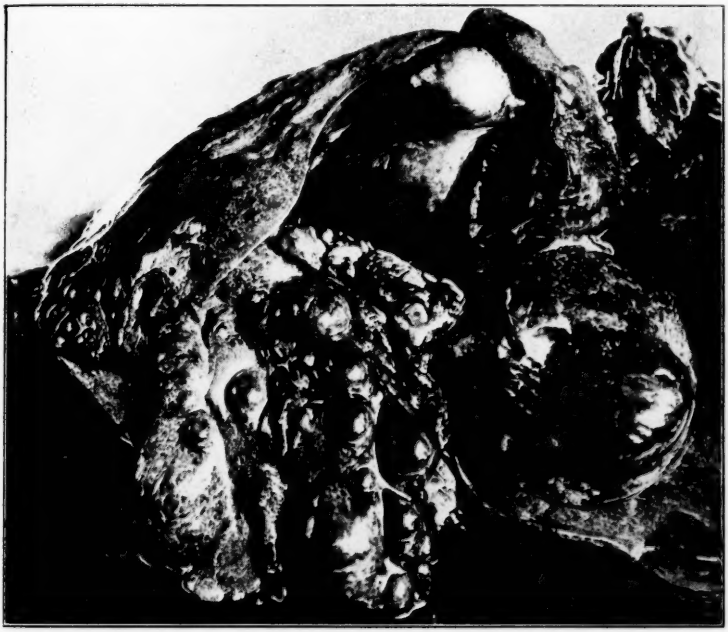
An aged collie dog was brought to me by a farmer with the history that the animal had been suffering from obstinate constipation, a condition which the administration of enemata and free dosage with castor oil had failed to relieve.

Examination showed the abdomen to be much distended, and palpation of the abdominal wall determined a condition of

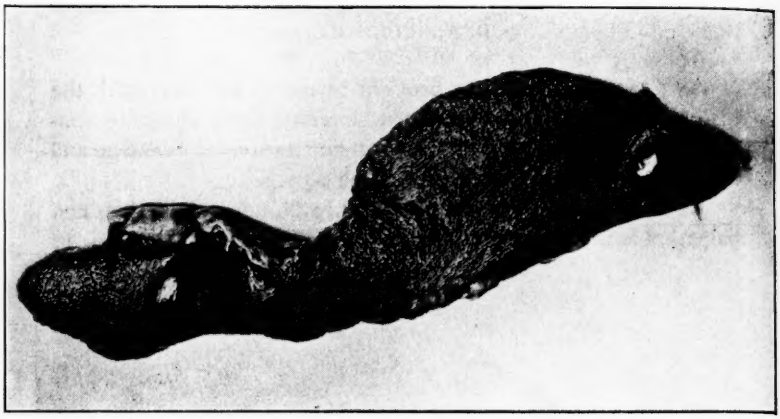


Liver with E. cysts.

ascites. Respirations and pulse were slightly accelerated. There was no jaundice.

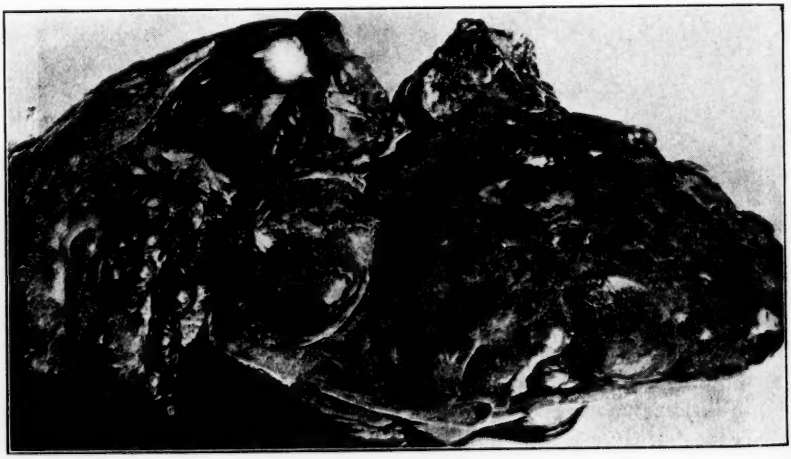
Prognosis was doubtful, the owner being informed that the dog was probably suffering from chronic liver disease resulting in serious embarrassment to the vascular system. At his urgent request treatment was undertaken. The constipation was overcome by a dose of aloin 1 dr. and calomel 3 gr. Subsequently calomel 2 gr. every third day and iodide of potash 5 gr.

XUM



Spleen with E. cysts.

twice daily were administered. The abdomen was tapped, and about two quarts of sero-sanguineous fluid drawn off. This operation afforded evident relief. The dog, which had previously refused all food, soon recovered his normal appetite, and appeared to be making fair progress. Within a week the dropsical transudate again began to accumulate. The animal



Liver with E. cysts.

became extremely emaciated, and finally died from exhaustion. *Post-mortem* examination revealed a very interesting condition.

The liver was enlarged, weighing 3 lb. 9 oz., the gall-bladder being greatly distended. The liver was the seat of very extensive infection by *Echinococcus polymorphous*. The spleen also contained two echinococcus cysts. The remaining organs appeared to be normal.

On opening the bowels numerous specimens of *Tænia marginata* and *Dipylidium caninum* were seen, and on close scrutiny after immersion in water a number of *Tæniæ echinnococci* were discovered.

Although hydatid disease from infection by *Echinococcus polymorphous* is known sometimes to occur in dogs, the condition is sufficiently uncommon to deserve mention.

THE DISEASE KNOWN AS "EVIL" IN SHEEP, AND ITS TREATMENT BY AUTOGENOUS VACCINES.

By J. F. D. TUTT, M.R.C.V.S., F.R.M.S.
Winchester.

Before proceeding it is necessary to make it quite clear to the reader that the name "Evil" has nothing whatsoever to do with joint evil, the lesions being exclusively on the head and neck, and, further, it occurs in adult sheep.

The writer has been unable to find any reference to this disease amongst recent veterinary literature, and search amongst older works has been barren of result with one exception. This is the more remarkable, as this complaint is well known to agriculturists, and it appears to be not so well known to the profession as it should, due, no doubt, to the fact that the sheep and its ailments has not been given the attention it deserves.

J. H. Steel, in his treatise on "Diseases of the Sheep," 1890, p. 65, says: "There is the disease vulgarly known as 'Evil,' described by Spooner as a hard swelling of the submaxillary glands, succeeded by small pustules on the head and neck, which break and discharge white matter, perhaps being succeeded by a second crop, almost uniformly fatal by its constituting a drain on the system, but occasionally benefited by iodide of potassium internally, and iodide of mercury externally. We must leave to

future research to determine what is really the nature of this condition."

The symptoms shown by the sheep (in lamb ewes) that came under my notice some little time ago were as follows:—

There was marked swelling of the nose, with pimple-like elevations containing pus of the "laudable" type.

Breathing was naturally interfered with and was noisy and "jerky." There was no discharge from the nose itself, and there was no evidence of stomatitis; the general condition did not appear to have suffered much, and the appetite on the whole was normal.

Some fresh pus was obtained from a pustule and forwarded to the Runcorn laboratories, where an autogenous vaccine was prepared from the following organisms which were found to be present:—

(1) A diplococcus.

(2) *Staphylococcus albus*.

(3) A club-shaped bacillus.

Each cubic centimetre of the vaccine represented 6,000,000,000 organisms, made up of 2,000,000,000 of each of the above-named organism.

Each sheep received as an initial dose $\frac{1}{3}$ c.c. At intervals of six days the dose was gradually increased, until at the end each sheep received 30,000,000,000 organisms.

It required nine inoculations in all before recovery was complete.

Previous to seeking professional advice the owner had tried an "Evil" mixture, consisting chiefly of sulphur, without any success.

SUCCESSFUL TREATMENT OF A CASE OF CHRONIC DIARRHŒA IN THE HORSE BY THE USE OF A STOCK VACCINE OF THE *BACILLUS COLI*.

By J. F. D. TUTT, M.R.C.V.S., F.R.M.S.

Winchester.

The subject was a bay riding gelding, and it had suffered from the complaint for some months past. All the known medicinal remedies had been tried, but were useless in arresting the disease, and on being seen the animal was very emaciated; the appetite was excellent. The diarrhœa was not unlike that observed in cases of Jöhne's disease in bovines. No intestinal parasites could be detected. Reaction to the tuberculin test was negative.

A stock vaccine of the *Bacillus coli* was obtained from Messrs.

Parke, Davis and Co. in tablet form, each tablet representing 500,000,000 of colon bacteria.

For the first two inoculations, which were given at an interval of four days, one tablet was given. It was then increased to two tablets every three days for a period of six weeks, when the complaint had quite disappeared and the general condition had become normal.

There has been no sign of a recurrence after nearly a year has elapsed.

ARMY VETERINARY SERVICE.

(*Extract from "London Gazette."*)

War Office, Whitehall, August 12.

REGULAR FORCES. ARMY VETERINARY CORPS.

To be temporary Lieutenant: G. Sutton, F.R.C.V.S. Dated August 1.

August 13.

To be temporary Majors: Captain A. S. Head, Reserve of Officers; temporary Lieutenant F. T. G. Hobday. Dated August 14.

August 16.

J. D. Broome to be temporary Captain, and not as stated in *Gazette* of August 3.

August 17.

To be temporary Lieutenants: R. Colthurst. Dated July 17. F. J. Ahams. Dated July 20. M. J. Brett, G. K. Shaw, W. H. Heaney. Dated August 1. J. McLean. Dated August 2. J. Edgar. Dated August 4.

August 18.

Captain W. C. Quinnell, late Australian Forces, to be temporary Captain. Dated July 28.

To be temporary Lieutenants: S. Villar, F.R.C.V.S., T. Russell. Dated August 1. T. A. McC. Finch. Dated August 2.

Surname of temporary Lieutenant W. Lenton is as now described, and not as stated in *Gazette* of July 9.

August 14.

TERRITORIAL FORCE RESERVE.

Captain J. S. Channon, from Army Veterinary Corps (T.F.), to be Captain. Dated August 15.

MEDITERRANEAN EXPEDITIONARY FORCE. ARMY VETERINARY CORPS.

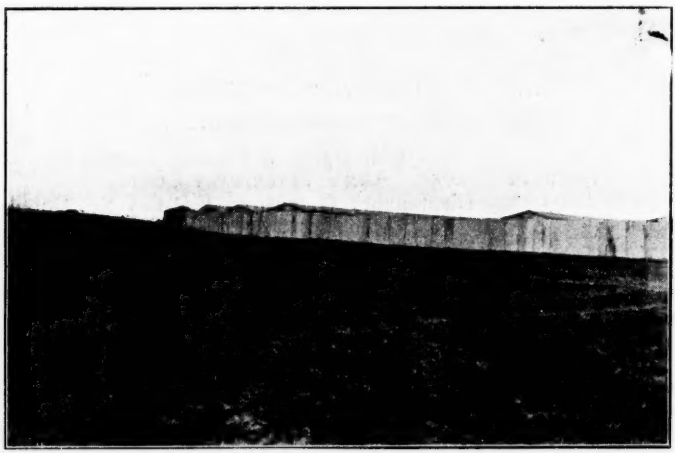
The following casualties in the Mediterranean Expeditionary Force are reported:—

Wounded.—Private H. T. Beamon, 4166; Private W. M. Cooper, 3590; Wali Muhammad, Veterinary Jamadar, Supply and Transport Corps.

XUM

ORIGINAL VIEWS OF ARMY VETERINARY CAMPS WITH THE EXPEDITIONARY FORCE IN FRANCE.

For the right to publish the following original and interesting photographic views of the work of the Army Veterinary Corps in France, we are indebted to Mr. George Monckton and to the proprietors of the *Illustrated London News*.



Army Veterinary Corps Veterinary Hospital.
Showing wind screen round avenues of stalls.

Army Veterinary Corps Veterinary Hospital.
General view of some of the buildings: the executive offices are on the right, the whiter buildings are some of the men's quarters.

ARMY VETERINARY CORPS VETERINARY CAMP.
A hopeless case.

ARMY VETERINARY CORPS VETERINARY HOSPITAL.
Showing system of fire protection. Numerous buckets on stands depicted are placed at regular intervals along the avenues of stalls.

EXTRACTS FROM THE DIARY OF AN ARMY VETERINARY OFFICER AT THE FRONT IN FRANCE.

October 14 to December 30, 1914.

Wednesday, October 14.—Reported arrival in France.

Saturday, October 17.—Left for the Front.

Tuesday, October 20.—Reached railhead. Reported to Divisional Headquarters. Attached to an infantry brigade. Left Divisional Headquarters at night by supply transport, and with an armed guard proceeded to Brigade Headquarters. Much firing heard during the journey. Sky illuminated by flashes.

Thursday, October 22.—Headquarters under heavy artillery fire throughout the day. Windows shattered. Roof of neighbouring house destroyed. Several horses killed. Extracted shrapnel from two horses. Detected one case of strangles, and sent one animal to Mobile Veterinary Section. This evening neighbouring farms in flames. Spent a comfortable night on straw.

Friday, October 23.—This village still under shell fire, shrapnel, high explosives, &c. Hospital adjoining damaged by shrapnel. Took refuge in cellar for some hours. Headquarters thinking of moving. Everybody standing to. Two aircraft over this morning. Germans have spotted our position. Village entirely deserted; a variety of animals wandering about.

Saturday, October 24.—Headquarters Brigade moved during the night. Shelled from 4.30 a.m. Sunday for two hours. Message was received: "Germans broken through part of the line." Whole Brigade proceeded to search neighbouring woods, a bayonet charge followed, twenty-seven prisoners taken, and enemy put back with heavy loss. In charge of Brigade Headquarters transport. Inspected all Brigade horses, dressed wounds, and removed several splinters of shrapnel.

Monday, October 26.—Heavy firing in distance all day. An English aeroplane five miles south of our position was seen in flames. Was brought to ground by our own men; both pilot and mechanic killed. Moved into fresh billet half a mile distant.

Tuesday, October 27.—Visited one of my units after dark. Two stray bullets embedded themselves in door of C.O.'s billet while I was present.

Wednesday, October 28.—Still in same billet. Found two cases suspicious of mange. Rode into neighbouring town of —— and lunched there. Bomb dropped from German aeroplane, but no damage done. Frenchman went up in pursuit. I found a cow and got a pint of milk for tea.

Thursday, October 29.—Big battle raging since midnight. Everyone standing to. Unable to visit all my horses.

Friday, October 30.—Bombs dropped into——; bombardment commenced.

Saturday, October 31.—Had four horses killed by shrapnel

during night of 30th. Two men were injured. Neighbouring chateau partly destroyed by shells. Several Staff officers wounded and some killed. Transport moved back four miles.

Sunday, November 1.—Billeted in a farm. Had a busy morning among my horses. Removed a bullet and several splinters of shrapnel.

Tuesday, November 3.—This village was shelled, one horse having been killed last night. Roads a network of shell holes. Evacuated six horses to-day as unfit for work; sixteen remounts received. Found a very emaciated horse (apparently French) and destroyed same.

Thursday, November 5.—Nothing of note has happened. Town still being bombarded. Four shells short range dropped into this village.

Friday, November 6.—Part of —— in flames; bombardment continues with vigour; sky illuminated by flashes for miles around.

Saturday, November 7.—News on the whole satisfactory; expecting to move at midnight. Neighbouring village shelled.

Sunday, November 8.—Still in same billet. Less shelling. Quieter day. Very busy with veterinary work.

Monday, November 9.—The position does not alter; have already been here a week. New A.F.H. 2,000 issued to me to-day—white instead of blue.

Thursday, November 12.—Rode out to —— to see horses and returned late; very dark night. The road took us within half a mile of German trenches.

Friday, November 13.—Very wet day. Guns quiet. Routine veterinary work.

Saturday, November 14.—Had message to attend machine gun horse in —— Wood. Rode out in afternoon, found animal peppered with shrapnel, and destroyed same. The Germans whilst seeking our batteries (concealed by roadside) dropped shell 10 yards over my head, same not exploding.

Sunday, November 15.—Snowing hard and freezing. Brigade expecting to go back for relief. Still in same billet.

Monday, November 16.—Paraded all sick horses. Moved at night with Brigade transport to billets N.W. of ——, on the outskirts of that town. Raining hard all day. Mud knee-deep; had much trouble with wagons, &c., in consequence. Town still under bombardment. Shells passing over our billets night and day incessantly, and falling into centre of town half a mile away.

Tuesday, November 17.—A beautiful day. Several horses injured as a result of last night's struggle in the mud. Pulled several out of ditches with drag ropes. New billet very comfortable—possesses a piano. We spend a happy evening in spite of shells.

Wednesday, November 18.—Nothing of note has happened. It was reported all bridges leading out of town were destroyed by shell fire. A reconnoitring party report all is well. We are going south for a short relief.

XUM

Thursday, November 19.—Snowing hard and freezing. Had a slight case of colic to-day—the first as yet.

Friday, November 20.—Left our billets N.W. of —— at 3 p.m. for ——, rested for two hours at midnight, fed and watered horses, &c. Continued our journey at 2 a.m. Arrived at —— 6 a.m. next morning. Freezing hard throughout journey. Roads glazed with ice. Horses not roughed. Journey very slow. Much trouble with general service wagons.

Saturday, November 21.—Bomb dropped in —— about 11 a.m. from German aircraft; damaged hospital. Killed one man, injured two. Horses billeted at various parts of the town.

Tuesday, November 24.—Two units of the Brigade take over a line of trenches for forty-eight hours. Prince of Wales and General French's Staff here to-day.

Wednesday, November 25.—Instructions to inspect and take over veterinary charge of a field ambulance.

Monday, November 30.—Reorganization of the Brigade is taking place. Eighteen remounts received to-day.

Tuesday, December 1.—Brigade standing to.

Thursday, December 3.—Brigade inspected by H.M. the King at 12.30 p.m. The King was accompanied by the Prince of Wales and his Staff.

Friday, December 18.—Found four suspicious mange cases. All confirmed. Much ringworm prevails.

Tuesday, December 22.—Left —— at 6.30 p.m., and travelled with transport during night to ——. Reached —— 6.30 a.m. Transport was parked in square, horses fed, watered, &c. At 8 a.m. left —— for small village near firing line. Raining hard all day; much mud. Met a Cavalry Division, much congestion resulted, and in consequence general service wagons, cookers, water-carts, &c., were left in ditches. Reached our destination at 6.30 p.m. on 23rd and were billeted.

Thursday, December 24 (Christmas Eve).—Inspected all horses of Brigade after journey.

Friday, December 25.—Routine veterinary work.

Monday, December 28.—Left this village at 5 p.m. Visited trenches with officer in charge of daily rations. Traversed whole line held by the regiment. Snipers at work all evening. Much volleying took place. Had supper in Headquarters dug-out, and arrived back at billet 12 p.m.

Tuesday, December 29.—Inspected all horses of a Field Company (R.E.) and of a Field Ambulance.

Wednesday, December 30.—Rode into ——, and met other veterinary officers there.

Selections.

STOMACH TUBE AS A DIAGNOSTIC.

By WALTER LAWSON, D.V.S.

I HAVE autopsied seven cases in two months, and I find the stomach tube a reliable diagnostic agent. I have been using the tube for four years on every case, and as Dr. Knisely, Dr. Phillips, and Dr. Merillat state, it will cure any curable case without medicine. I have autopsied twenty-nine cases in four years, and, except one, death was certainly due to fermentation and gas formation causing rupture, twist or telescoping of the bowel.

If you inject five or six gallons of water into the stomach and get a return flow, you can depend on it that the stomach or small intestines are not ruptured. If there is no return flow and you can hear the water rushing along by putting your ear to the right flank, you may be sure the trouble is in the single or double colon. If after emptying the stomach the horse gets worse you may expect a death. In all of my cases the first treatment will prove the diagnosis. If a twist, rupture, or other incurable ailment, the animal will still be in pain after first using the tube, and you can tell the owner the outcome. Now, why should we want to use aloes, oil, eserine, or arecoline for such cases?

To start with, the trouble can be from nothing else than indigestion, the fermentation causing gas, and then the rupture, &c., soon follow. I use a handful of table salt and the same of borax in washing the stomach, leaving the same quantity with six or seven gallons of water in the stomach when cleansed. If from impaction of the double colon from alfalfa, I keep them full of water, injecting three or four gallons in the stomach every hour, hot water preferred. How that congested, inflamed, strained, sore gut is to perform its work until soothed and the soreness removed so that it can is a question. There is no treatment so healing, quieting, and soothing as hot water. Any case (as Professor Merillat says) that can be cured with cathartics, slow or swift, can be cured quicker with the stomach tube, and the patient will eat quicker than when treated with a lot of poisonous drugs.

I at first used the tube through the nasal route, but the clients

did not like the blood that we get sometimes, so I use it through the mouth and like it much better. I can use it through the mouth of a year-old colt. I do not need to tie so fast when using it through the mouth in passing the tube, as many times I pass it with the horse in a corral or lot, but I use the speculum one-half closed. Too wide open interferes with breathing.

Death from colic is terrible. A fine horse will go out in the morning, and the next morning is dead. What is the cause? My experience is it is gas. If this will benefit anyone or cause any new treatment publish it, as we will have colics as long as we have horses.—*American Journal of Veterinary Medicine.*

SENILE PARALYSIS.

By M. R. STEFFEN.

This is a condition which occurs with considerable regularity in old cows. In most cases it takes what may be termed a progressive form, starting with a stiffness in one hind leg. After weeks, sometimes months, a lameness develops in one hind leg, without any evidence of swelling or any localized area of soreness. About at this time it is noticed that the cow "cannot get up as well as she used to"; she seems to be weak in the posterior parts. Also about at this time she begins to look bad; does not thrive or keep in her usual good condition, although her appetite is apparently as good as ever.

Very soon after the trouble has reached this stage the cow becomes entirely unable to get up without assistance. This condition is confined to aged cows, and is never seen in cows under 9 or 10 years old.

Usually it is best in these cases to advise the destruction of the cow. While now and then one of these cases improves sufficiently under treatment to enable the owner to dispose of the cow in some other manner, it is usually a loss from a financial standpoint to attempt their cure.

The condition is seen both in cows which are in various stages of pregnancy and in cows which are barren. It seems, however, to run a more rapid course in pregnant cows.—*American Journal of Veterinary Medicine.*

XUM

PERSISTENT ANOREXIA.

By M. R. STEFFEN.

THIS seems perhaps an odd name. Anorexia, or lack of appetite, usually is only one of the symptoms of a disease. In the condition I am about to speak of, anorexia is the whole disease and the whole symptomatology.

These are aggravating cases for the veterinarian. To the owner the case appears very simple; the cow "just won't eat anything." Nothing else of an abnormal nature can be seen. Cases have been reported in which this inappetence or anorexia persisted for two weeks without any evidence of other disease or a sign upon which to base a diagnosis.

In my own experience I have never been able to make a definite diagnosis in these cases, and other experienced practitioners with whom I have discussed this subject make the same confession. The cow simply (and merely, and only and every other which way) will not eat. That is all. Examine her as carefully and as thoroughly as you can, and you disclose absolutely nothing else which will help you in diagnosis. For this reason I know of no better name for the condition than that of "persistent anorexia."

Because the loss of appetite is the only symptom, the owner usually does not call the veterinarian in until the case has been running along two or three days.

In any other cases than a case of persistent anorexia the cow would have developed more or less positive signs pointing to the nature of the trouble in such a period of time. In persistent anorexia, however, nothing has developed. The owner tells you she has not eaten for so and so long and she will not eat now. When you get through with your examination you know no more; first, last, and all the time "she simply won't eat."

The prognosis must be very guarded. The cow may begin to eat again very shortly after you have prescribed for her, and then again she may not come back to feeding for a week or more.

In my practice I have tried many different remedies for this condition. Until we discover the cause or the nature of this ailment our treatment will be more or less empirical, and to my knowledge the pathology in persistent anorexia has never been explained. My best results have come from agents acid in reaction; lately, I use dilute acetic acid, giving 2 oz. morning and evening for two or three days, with an equal amount of water.—*American Journal of Veterinary Medicine.*

XUM

DISEASES OF ANIMALS ACTS, 1894 TO 1914.

NUMBER OF OUTBREAKS AND OF ANIMALS ATTACKED OR SLAUGHTERED.

Great Britain.

(*From the Returns of the Board of Agriculture and Fisheries.*)

DISEASE	JULY		SEVEN MONTHS ENDED JULY	
	1915	1914	1915	1914
Anthrax—				
Outbreaks	35	41	393	482
Animals attacked	50	51	451	522
Foot-and-Mouth Disease—				
Outbreaks	—	—	—	11
Animals attacked	—	—	—	74
Glanders (including Farcy)—				
Outbreaks	7	15	32	68
Animals attacked	20	70	59	212
Parasitic Mange—				
Outbreaks	124	123	*535	1,503
Animals attacked	271	157	*1,171	2,613
Sheep-Scab—				
Outbreaks	3	3	159	150
Swine Fever—				
Outbreaks	415	411	2,747	2,599
Swine slaughtered as diseased or exposed to infection	1,583	4,947	12,360	27,518

* Figures for four months only, the Parasitic Mange Order of 1911 having been suspended from August 6, 1914, to March 27, 1915, inclusive.

Ireland.

(*From the Returns of the Department of Agriculture and Technical Instruction for Ireland.*

DISEASE	JULY		SEVEN MONTHS ENDED JULY	
	1915	1914	1915	1914
Anthrax—				
Outbreaks	—	—	1	1
Animals attacked	—	—	1	1
Foot-and-Mouth Disease—				
Outbreaks	—	1	—	76
Animals attacked	—	2	—	957
Glanders (including Farcy)—				
Outbreaks	—	—	1	—
Animals attacked	—	—	3	—
Parasitic Mange—				
Outbreaks	8	6	44	55
heep-Scab—				
Outbreaks	14	28	268	375
wine Fever—				
Outbreaks	22	26	162	142
Swine slaughtered as diseased or exposed to infection	87	69	910	712

PREVALENCE OF ANIMAL DISEASES ON THE CONTINENT.

(From the *Journal of the Board of Agriculture.*)

THE following statement shows that according to the information in the possession of the Board on August 1, 1915, certain diseases of animals existed in the countries specified:—

Austria (on July 14).—Foot-and-mouth disease, glanders and farcy, swine erysipelas, swine fever.

Denmark (month of June).—Anthrax, foot-and-mouth disease (1,201 outbreaks), glanders and farcy, swine erysipelas, swine fever.

France (for the period July 4—17).—Foot-and-mouth disease, glanders and farcy, sheep-pox.

Germany (for the period July 1—15).—Foot-and-mouth disease, glanders and farcy, swine fever.

Holland (month of June).—Anthrax, foot-and-mouth disease (186 outbreaks), foot-rot, glanders, swine erysipelas.

Hungary (on July 14).—Foot-and-mouth disease, glanders and farcy, swine erysipelas, swine fever.

Italy (for the period July 12—18).—Anthrax, blackleg, foot-and-mouth disease (226 outbreaks), glanders and farcy, rabies, sheep-scab, swine fever, tuberculosis.

Norway (month of June).—Anthrax, blackleg, swine fever.

Rumania (for the period June 21—29).—Anthrax, foot-and-mouth disease, glanders and farcy, rabies, sheep-pox, swine erysipelas, swine fever.

Russia (month of March).—Anthrax, foot-and-mouth disease (50,278 animals), glanders and farcy, pleuro-pneumonia, rabies, sheep-pox, swine erysipelas, swine fever.

Spain (month of May).—Anthrax, dourine, glanders, pleuro-pneumonia, rabies, sheep-pox, sheep-scab, swine erysipelas, tuberculosis.

Sweden (month of June).—Anthrax, blackleg, foot-and-mouth disease (3 outbreaks), swine fever.

Switzerland (for the period July 19—25).—Anthrax, blackleg, foot-and-mouth disease (26 "étables" entailing 3,712 animals, of which 7 "étables" were declared infected during the period), glanders, swine fever.

No further returns have been received in respect of the following countries: Belgium, Bulgaria, Montenegro, Serbia.

XUM

THE ARTILLERY HORSE.

Do We want a New Breed?

A correspondent writes to the *Yorkshire Post*:—

"A feature of the horse purchasing transactions of the War has been the eagerness of Government buyers to secure the gunner type of horse found on many Lakeland fell farms. These animals, which represent perhaps two-thirds of Clydesdale blood on a fell pony foundation, are stoutly built, run from 15 to 16 hands high, and it is claimed they are more active and enduring, and can maintain their condition on less food than the pure Clydesdale or Shire. They make excellent artillery horses, and it is noteworthy that England, the stud farm of the world, has no pure breed that fulfils all requirements as a gun horse, the heavy breeds being too sluggish and the light breeds too light. As three or four horses are required for the artillery and transport for one for the cavalry, this points to the need of a new breed.

"The type preferred by the artillery officer is the heavy-weight hunter—an animal who may be described as the battle cruiser of the horse world, a maximum combination of speed and strength, uniting much of the power of the Shire with much of the fleetness of the racer. The English 16-stone hunter is probably the most useful all-round, general utility horse in the world; he is good for the gun, and the plough, as the saddle. What is generally overlooked is that it is hopeless to expect a general revival of light horse breeding in England, unless the breed is strong enough to earn its keep at farm work. When an old heavy-weight hunter finds his way, through accident or old age, into a farm team, he will be found to out-foot, out-work, and out-stay the more ponderous Shire or Clydesdale, and, walking easily a mile an hour faster than the two breeds named, he proves the most economical horse on the farm.

"The researches of Mr. Smith Hill, Principal of the Aspatria Agricultural College, have shown that fifty years ago the favourite horse on Cumberland farms was the half-bred, which was preferred because of a superior activity, but since then the profitable market for town horses has led to the Clydesdale coming into general use. The creation, therefore, of a new breed of artillery horses of the heavy-weight hunter type would be an advantage, not only to the Army, but to agriculture.

"It may be noted, in this connection, that the Irish draught horse, the Pembrokeshire cart horse, and the Devonshire pack horse—old breeds which, with the support of the Irish Department of Agriculture and English Board of Agriculture, it is sought to revive—are all better adapted to artillery work than the Shire, the Clydesdale, and the Suffolk."

SALE OF ARMY MARES.

With a view of encouraging and assisting the breeding of light horses, the Board of Agriculture and Fisheries have been authorized by the War Office to arrange for the sale of some mares which have been returned from abroad as no longer suit-

able for use with the Expeditionary Force, and which have been specially selected by the Board as of types suitable for breeding purposes.

The mares will be sold by public auction, on the express condition that they are not at any time to be exported out of the country. To secure observance of this condition the mares will be branded with a distinctive mark of diamond shape.

The mares have passed the mallein test for glanders to the satisfaction of the Board's veterinary officers, but no guarantee is given as to their age, soundness, or otherwise. They can be examined prior to disposal at the places of sale by veterinary surgeons on behalf of intending purchasers. The mares can be seen at the cattle testing station, Pirbright, Surrey, by arrangement with the inspector in charge.

Review.

Table of Veterinary Posology and Therapeutics for Students and Practitioners. By G. A. Banham, F.R.C.V.S., and William J. Young, F.R.C.V.S., D.V.S.M.Vict. Foolscap 8vo, pp. xvi + 272. Messrs. Baillière, Tindall and Cox, 8, Henrietta Street, Covent Garden, London, W.C. 1915. Price 3s. 6d. net.

This is the fourth edition of a little book which is to be found in almost every veterinary surgery, and which is well known to all students and practitioners. In the compilation of this edition the author has had the help of well-known members of the profession, and the volume benefits by their co-operation. Messrs. A. W. N. Pillers, F.R.C.V.S.; Henry Gray, M.R.C.V.S.; J. S. Lloyd, F.R.C.V.S., D.V.S.M.; and Sir John M'Fadyean have all assisted with material or suggestions.

Many additions have been made to the contents of previous editions, and they all add to the usefulness of the handbook. The most acceptable further pages appear to be those dealing with the percentage composition of feeding-stuffs, table of comparative anatomical weights, capacities and measurements, table of drugs excreted by the mammary gland, table of names given to horses, cattle, sheep, and pigs according to age and sex. To the man whose lot is cast in different parts of these isles these names will be a godsend. We know from experience that local nomenclature has often befogged us more than the diagnosis of disease. The section might have been extended to include the explanation of such terms as "the yellows," "farcy," "a shake," &c.

The posological section of the work is as satisfactory and more extensive than ever, and although we notice the omission of such useful drugs as protargol and argyrol from the list, yet we find acetanilide, hydrogen peroxide, and liquid paraffin included.

We should have liked to see the subcutaneous method of medication gone into more fully and the doses given more exactly than by recommendation of a $\frac{1}{10}$ part of the oral dose, which in

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many cases would be right, but in others somewhat awry. For instance, if we take veratrine the subcutaneous dose for the pig would be $\frac{1}{30}$ gr. to $\frac{1}{20}$ gr., whereas the proper dose is $\frac{1}{4}$ gr. to $\frac{1}{3}$ gr. Other examples of wrong guidance (if the direction given is accepted) in the case of subcutaneous dosage might be cited. In looking over the list of diseases and their remedies, we have wondered whether such a condition as "pica" still exists. A few days ago we consulted the little work on this subject, but could not find any mention of the ailment.

We know the weary monotony attached to the reading of proofs, but are inclined to think that this operation is not as carefully done as in past days. Even with a rather extensive list of errata given on p. xiv it grates on us to find such words as *Pnemuonia* on p. 134 and *vesticles* on p. 230. The duration of heat in the sow is given as two to four days; if this is an average, we think the mean is nearer two days than two to four. The number of mares allowable to a stallion needs qualifying as regards breed and age. We are rather surprised that such terms as "barrow" and "jointer" are not included in the list of names given to pigs.

Apart from these minor criticisms we have nothing but praise for the little work. Its compilation must have necessitated much reference, research, and tabulating. It is a reliable, complete, and handy companion for the veterinary surgeon and student in the moments occupied in fitting the remedy to the disease.

G. M.

Obituary.

WIRKL.-GEHEIMRAT PAUL EHRLICH.

Director of the Royal Institute for Experimental Therapy, Frankfurt-am-Main.

THE death is announced of Professor Paul Ehrlich, the Director of the Royal Institute for Experimental Therapy and of the Georg Speyer House for Experimental Chemotherapy at Frankfurt-am-Main, who was probably the best known as well as the most original and ingenious pathologist of his day. Paul Ehrlich was born in 1854 at Strehlen, in Silesia, his father being a Jew, says the *Lancet*. He was educated at the University of Breslau, and graduated later in medicine at Strasburg. Almost from the beginning of his scientific studies he devoted much attention to the chemical aspects of medicine, especially to the action of chemical substances on living bodies. First he commenced an investigation as to the results produced on living cells by the injection of aniline dyes, and his earliest researches into the methylene-blue reactions of living nerve substances were published as long as thirty years ago.

Paul Ehrlich will be remembered for his investigations on the specific action of dyes on living tissues, for the "side-chain" theory, and for the discovery of salvarsan. Possessed of the truly scientific spirit in the highest degree, his aims were yet consistently practical and utilitarian, and even his speculative and

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highly involved hypotheses had a practical aspect, and were often used simply as a scaffolding upon which to build further advances in experimental work. This practical bias of mind puts Ehrlich in company with Pasteur, Lister, and Koch, whose work he continued and amplified, and perhaps the greatest praise that can be given him is to associate him with them as a worthy compeer. It was in the study of hæmatology that he first came to the front, and here he was a pioneer. The use of methylene-blue injected *intra vitam* as a means of studying oxidation processes in the body, although a commonplace of the text-books of physiology, is perhaps less generally known but is none the less a striking original piece of work.

Until his introduction of salvarsan Ehrlich was perhaps most widely known for his "side-chain" theory. The conditions of immunity have had surprises even for those who have observed them most closely. That in the case of many diseases one attack was capable of rendering a person practically perfectly immune to subsequent infection was indeed strange, and the fact that very occasionally a second attack might be recorded did little to lessen the wonder. Though the fact was so patent, the explanation was far to seek. Equally strange was the fact that some epidemic diseases might affect animals and yet not attack man. Both before and after the discovery that infectious maladies were due to the presence of germs many theories were evolved to attempt to account for the immunity, but none could be accepted as really explanatory. Ehrlich did not venture to attempt to give a real explanation of the facts in connection with immunity, but he showed that very many of the problems of infection and immunity were closely allied with the action of drugs. He pointed out that all antiseptics were not equally active with all micro-organisms; he showed that an antiseptic capable of destroying one germ might prove useless in the very same strength against another bacterium, though another antiseptic, powerful against the second microbe, might prove unavailing in the same strength against the first. Then he showed that the same was true of all drugs acting on living bodies; hence it followed that there must be some condition present in the living cells of the body which enabled a drug or an infecting microbe to affect that living cell. This conception of the phenomena of immunity is formed entirely on a chemical basis, and there is much that may be urged in support of the theory; but it would be going too far to say that it serves to explain all the facts which are known. Nevertheless, the theory is useful as a working hypothesis, and it has served as the basis of an extensive investigation. Once it has been recognized that the phenomena of immunity are best explicable as the results of chemical reactions, we are provided with a starting-point for the investigation of the mode of action of the substance in the body which causes the immunity, and the formation of antibodies for therapeutic use has gone far to support Ehrlich's theory.

Another of Ehrlich's practical contributions to the study of immunity, and an important one, was his brilliant work upon the standardization of diphtheria antitoxin, but the discovery which

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brought Ehrlich's name before the public was the introduction of salvarsan. It was no haphazard discovery, but it was based on a long series of investigations proceeding along well-defined lines. He aimed at some substance which should destroy completely all the spirochætæ pallidæ in the body. He started from the fact that arsenic had been used with success in the treatment of syphilis, and he designed to obtain a substance which, while causing the minimum of harm to the human body, should be a potent agent in destroying the spirochæte. After a large amount of work Ehrlich at length evolved salvarsan, or dioxydiaminoarsenobenzol, "606," as it was called in the convenient phraseology of the laboratory, and the drug was found at once to exert a wonderful influence on syphilis. Experience has confirmed the value of Ehrlich's work. The drug causes a marvellous improvement to occur with extreme rapidity, and though experience has shown that there is no "sterilisatio magna," yet the benefit is great and lasting, and this in the vast majority of cases without any harmful effect on the patient.

Ehrlich's life has been full of great and useful achievements, and his loss at the present time is one upon which all nations, whether at war or at peace, can condole with Germany. Honoured by many countries and universities and a winner of the Nobel Prize, he was a benefactor of mankind, and we gladly pay homage to a life spent in the advancement of knowledge, the saving of life, and the lessening of suffering.

Professor Ehrlich married Hedwig, the daughter of Privy Commercial Councillor Pinkus, and he leaves two daughters, both of whom are married to German scientific men.

Albert Marshall, M.R.C.V.S., Victoria Road, Dartmouth, S. Devon. Graduated Edin., July, 1886. Mr. Marshall died on August 6. Aged 50.

George Alexander Thompson, M.R.C.V.S., City Chambers, Edinburgh. Graduated Edin., December, 1891. Mr. Thompson's death occurred on July 1.

Harold Sanderson, Ladywell, Roundhay, Leeds. Died on July 27, aged 36. Graduated July 17, 1902, London.

George Wartnaby, the Board of Agriculture's Veterinary Inspector for the counties of Staffordshire and Derbyshire, died at his home, Burton-on-Trent, on the 30th ult., at the age of 64.

Registered "Existing Practitioner."

Robert F. Sanders, Windmilland, Black Torrington, *viâ* Highampton, Devon. Died on August 4, aged 72.

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